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10/528,342

10/28/2005

Hans-Jurgen Tolle

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11/03/2008

HARNESS, DICKEY & PIERCE, P.L.C.

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EXAMINER

DESAL, NAISHADH N

ART UNIT

PAPER NUMBER

2834

MAIL DATE

DELIVERY MODE

11/03/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/528,342

**Applicant(s)**

TOLLE ET AL.

**Examiner**

NAISHADH N. DESAI

**Art Unit**

2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 September 2008.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-26 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-26 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 18 March 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-8508)  
Paper No(s)/Mail Date 9/23/2008

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Drawings*

1. The drawings stand objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "coolant flowing through a stator cooling ring of the electric submarine drive motor" in claim 1 must be shown or the feature(s) canceled from the claim(s). Applicant remarks that claim 1 is amended in response to examiner's previous objection to the drawing made by. It is still not specifically clear how exactly the coolant is flowing through a stator ring of the motor. In view current disclosure / explanation (or lack thereof), examiner is going to rely on "broadest reasonable interpretation to advance prosecution of case on its merits. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New

Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

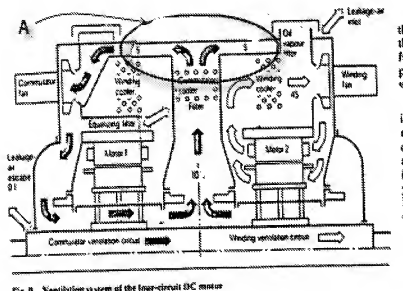
1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 10 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heine et al (NPL "Four-Circuit Dc Motor For Submarine Propulsion" Siemens Power Engineering & Automation, Siemens Ag, Berlin, DE, vol. 7, no. 2, March 1985 (1985-03)), in view of Lehman (US 4313309) in view of Garis (US 5078628)

3. Regarding claim 1:

A redundant cooling device for an electric submarine drive motor, comprising (Fig 9 and page 100 Col 3 ll 4-8):

a first cooling circuit and a second cooling circuit, adapted to transport thermal energy away from the electric submarine drive motor, wherein coolant of the first cooling circuit and coolant of the second cooling circuit are adapted to flow in counter current (Fig 9) through a stator cooling ring of the electric submarine drive motor, in a region of the electric submarine drive motor (Fig 9 and Fig 9.A below and page 100 Col 1 ll 1-7).



Regarding claim 1 above, Heine et al teaches a motor to be used in a submarine. Heine et al do not appear to literally teach that the motor is using liquid cooling. Garis (abstract and Fig 3,56 and Col 6 ll 27-50) teaches an electric motor for submersible vessels using liquid as a coolant fluid. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to combine the teachings of Heine et al with Garis to make a motor having redundant cooling circuits using liquid as a coolant fluid. The motivation to do so would be that it would allow for improved and more efficient cooling of the device.

4. Regarding claim 10, Heine et al discloses the use of air and seawater as coolant (Page 100 and Col 3 ll 4-7).

5. Regarding claim 26, Heine et al (Fig 9) and Garis (Fig 3) teaches that the first and second cooling circuits are identical cooling loops. Since the circuits are identical, it is obvious that the capacity are the same for the two circuits, else the motor would be receiving greater cooling on one circuit than the other and the motor would have difficulty functioning at its optimum efficiency.

Claims 2,4,11,19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heine et al and Garis as applied to claim 1 above, in view of Lehman (US 4313309).

6. Regarding claim 2:

Figure 2 of Lehman shows a main (high stage pump) and a minor (low stage pump). It is well known to those skilled in the art for the low stage device to have considerably lower power than the high stage device. The Lehman only discloses a single circuit, but it is well known to those skilled in the art to duplicate the parts of the first circuit and arrange them in a second circuit.

Heine et al teaches the use of counter flowing cooling circuits. Heine et al do not appear to literally teach that the motor is using liquid cooling. Garis teaches an electric motor for submersible vessels using liquid as a coolant fluid. Garis does not appear to explicitly show the pumps used for cooling. Lehman teaches the use of high and low stage

compressors to be used in cooling circuits. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Heine et al and Garis to show both main and minor pumps in the cooling circuits. The motivation to do so would be that it would allow one to significantly reduce electrical power consumption (Col 1 ll 33-39,48-49 of Lehman).

7. Regarding claim 4:

Figure 2 of Lehman clearly shows that the low stage and high stage compressors can be operated independently and that both stages have on-off operating modes (abstract of Lehman).

8. Regarding claim 11:

Heine et al, Garis and Lehman discloses the device as in claim 2 above. Lehman also teaches the use of a power supply and switching unit or control unit to be assigned to the cooling circuits. In regards to claim 11, Heine et al, Garis and Lehman discloses the claimed invention except for the multiplicity of cooling branches. Nonetheless it would have been obvious to one having ordinary skills in the art at the time the invention was made to duplicate and add another cooling branch to the cooling circuits since it has been held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced. In re Harza, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

9. Regarding claim 19:

Heine et al and Garis do not disclose the use of temperature sensor in the cooling circuits. Lehman teaches the use of a temperature sensitive probe (Col 4, lines 19-20 and 24-32). It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Heine et al and Garis to include the temperature sensor of Lehman. The motivation to do so would be that it would allow one to control the motors and compressors (Col 4 lines 25-32 of Lehman).

Claims 12-14,16, 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heine et al and Garis as applied to claim 1 above in view of Lehman (US 4313309) and further in view of McCabria (US 5196746).

10. Regarding claim 12:

Heine et al, Garis and Lehman do not appear to disclose the motors to be constant voltage and variable frequency motors. McCabria teaches the use of variable speed constant frequency type motors. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to incorporate the teachings of McCabria into the device of Heine et al, Garis and Lehman to make motors having a fixed supply voltage and frequency. The motivation to do so would be that it would eliminate the need to have separate supply voltage lines for the different motors.

11. Regarding claim 13:

Fig 1 of McCabria shows the use of inverters (elements 54 and 290) in a cooling circuit to control the amount of cooling of the cooling fluid.



12. Regarding claim 14:

Heine et al clearly discloses a three-phase motor (page 97 Col 2 ll 27-37 and page 98 Col 3 ll 4-11). Heine et al do not explicitly disclose the use of a squirrel cage motor. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to choose a three-phase motor of the squirrel cage type. The motivation to do so would be that the squirrel cage motor would be less expensive and require less maintenance.

13. Regarding claim 16:

McCabria discloses the use of both a primary and auxiliary reservoir (Col 3 lines 22-25).

14. Regarding claim 22:

Heine et al, Garis and Lehman discloses the device as in claim 2 above. Heine et al, Garis and Lehman do not disclose a non-return or one-way valve. McCabria shows in Figure 1 the use of pressure sensitive one-way valves. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Heine et al, Garis and Lehman with the one-way valves of McCabria. The motivation to do so would be that it would prohibit leakage of fluid in the direction it came from and permit better control over direction of cooling fluid in the cooling circuits.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heine et al and Garis, in view of Lehman and further in view of Twerdochlib (US 4766557).

15. Regarding claim 20:

Heine et al, Garis and Lehman teaches the device of claim 11 above. Heine et al, Garis and Lehman do not show pressure independent flow governor. Twerdochlib teaches the use of a flow governor which is not dependent on pressure in Col 3 lines 4-5. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Heine et al and Lehman to have the pressure independent flow governor of Twerdochlib. The motivation to do so would be that it would allow for better control of the flow of fluid and pressure control in the cooling circuits. Regarding the placement of parts, Heine et al, Garis and Lehman discloses the claimed invention except for explicitly showing that the flow governor is upstream of the stator, inverter module and power supply and switching unit. It would have been obvious to one having ordinary skill in the art at the time the invention was made to arrange the flow governor to be upstream of the stator, inverter module and power supply and switching unit, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japiske*, 86 USPQ 70.

Claims 3,5,15,24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heine et al, Garis in view of Lehman and further in view of Wiedemann (US 3089969).

16. Regarding claim 3:

Figure 1 of Wiedemann shows two motors driving two separate pumps. It is well known to those skilled in the art for motors driving separate circuits to have independent supply

voltages. Heine et al, Garis and Lehman teaches the device per claim 1 above. Heine et al, Garis and Lehman do not explicitly disclose the supply voltages to be independent for the cooling circuits' motors or pumps. Wiedemann shows two cooling circuits to have two separate motors. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the circuits of Heine et al, Garis and Lehmann with the teachings of Wiedemann to show the motors having separate supply voltages. The motivation to do so is that it is well known to those skilled in the art to have independent supply voltages for independent circuits and to allow for continued operation of the device without any interruption.

17. Regarding claim 5:

Lehman teaches the control unit to be able to run the cooling circuit on the high stage above the low speed range of the low stage.

It would have been obvious to one having ordinary skills in the art at the time the invention was made to make the high stage device run above the low speed range of the apparatus, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

18. Regarding claim 24:

Lehman teaches the control unit to be able to run the cooling circuit on the low stage independently of the high stage.

19. Regarding claim 25:

Lehman teaches the control unit to be able to run the cooling circuit on the high stage independently of the low stage.

20. Regarding claim 15:

Heine et al, Garis and Lehman teaches the device of claim 2 above. Heine et al, Garis and Lehman do not show the motors to have independent supply voltages. Wiedemann in Figure 1 shows the two cooling circuits to have two separate motors (main and minor). It is well known to those skilled in the art to have independent power supplies for the two independent motors shown in Figure 1 of Wiedemann. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Heine et al, Garis and Lehman with the independent supply voltages of the motors in Figure 1 of Wiedemann. The motivation to do so would be that it would provide a more robust and reliable cooling circuit and allow for the device to run without interruption from the other motors.

Claims 6,8 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heine et al and Garis in view of Amaral et al (US 6901765).

21. Regarding claim 6:

Figure 1 of Amaral et al clearly shows coupling valves that are arranged in transfer lines between the two cooling circuits. Heine et al teaches the device as in claim 1 above. Heine et al, Garis does not explicitly show the coupling valves. Amaral et al clearly

shows the use of coupling valves in a redundant cooling circuit. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Heine et al and Garis with the coupling valves of Amaral et al. The motivation to do so would be that it would provide better control of coolant flow in the circuits.

22. Regarding claim 8:

Amaral et al discloses the claimed invention except for the parts to be arranged on the upper part of the cooling circuit. It would have been obvious to one having ordinary skill in the art at the time the invention was made to arrange the parts of the cooling circuit on the upper part of the drive motor, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japiske*, 86 USPQ 70.

23. Regarding claim 21:

Heine et al and Garis do not explicitly show the temperature controlled three-way valve. Amaral et al clearly shows the three-way valve in the heat exchanging cooling circuit in Figure 1. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Heine et al and Garis to include the three-way valve of Amaral et al. The motivation to do so would be that it would allow one to connect, redirect and control more cooling paths.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heine et al and Garis in view of Amaral et al (US 6901765) and further in view of Lehman (US 4313309).

24. Regarding claim 7:

Heine et al, Garis and Amaral et al disclose the device as in claim 6 above and to vary the circulation of the cooling circuits. Heine et al, Garis and Amaral et al do not disclose the output power of the drive motor to be adaptable to the amount of removable heat. Lehman discloses that the operation of the low stage is always intermittent due to the changing temperature, which equates to amount of removable heat. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Heine et al, Garis and Amaral et al to have the output power of the motor being adaptable to the amount of removable heat. The motivation to do so would be that it would reduce the power consumption and minimize the duration which the motors need to be operated (Col 1 lines 32-39 of Lehman).

Claims 9 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heine et al and Garis as applied to claim 1 above in view of Rowe (US 6596175).

25. Regarding claim 9:

Heine et al and Garis disclose the device as in claim 1 above. Heine et al and Garis do not disclose the cooling circuit to have an inverter circuit module. Figure 1 of Rowe shows the cooling circuit to have a rectifier element which is directly cooled by the cooling circuit. It would have been obvious to a person having ordinary skills in the art at

the time the invention was made to modify the device of Heine et al and Garis to include the inverter circuit of Rowe. The motivation to do so would be that it would prevent the rectifier or inverter unit from overheating and to operate it under a stable temperature for maximum efficiency.

26. Regarding claim 17:

Heine et al and Garis disclose the device as in claim 1 above. Heine et al and Garis do not disclose the cooling circuit to have a degassing device or a service connection. Rowe teaches the use of both a degassing device and a service connection. Figure 1 of Rowe shows the reservoir tank to have a vent and element 40 to be a flow valve, which can be manually operated to allow a technician to periodically inject carbon dioxide to clear the strainer (Col 5 lines 1-6 of Rowe). It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Heine et al and Garis to include the degassing device and the service connection of Rowe. The motivation to do so would be that it protect the system from developing too much pressure and improve the lifespan of the system by allowing to manually service and monitor it under regular intervals.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heine et al and Garis as applied to claim 1 above, in view of Twerdochlib (US 4766557).

27. Regarding claim 18:

Heine et al and Garis disclose the device as in claim 1 above. Heine et al and Garis do not disclose the cooling circuit to have a pressure relief valve. Twerdochlib teaches the

use of a pressure regulator in figure 1 and Col 3 lines 4-5. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Heine et al and Garis to include the pressure regulator of Twerdochlib. The motivation to do so would be that it would allow one to maintain proper pressure range of the fluid (Col 3 lines 1-3 of Twerdochlib).

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heine et al and Garis as applied to claim 1 above, in view of Mantovani (US 4916341).

28. Regarding claim 23:

Heine et al and Garis disclose the device as in claim 1 above. Heine et al and Garis do not disclose the cooling circuit to have quick action couplings or connectors. Mantovani teaches the use of quick couplings to connect and disconnect rapidly and easily (Col 2 lines 1-2). The use of quick couplings are very well known to those skilled in the art. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Heine et al and Garis to include the quick couplings devices of Mantovani. The motivation to do so would be that it would allow one to connect and disconnect the cooling lines as needed and that it would improve maintenance access to cooling lines.

### ***Conclusion***

29. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO-892 for details.

### ***Response to Arguments***



30. Applicant's arguments with respect to claims 1-25 have been considered but are moot in view of the new ground(s) of rejection.

31. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

32. Any inquiry concerning this communication or earlier communications from the examiner should be directed to NAISHADH N. DESAI whose telephone number is (571)270-3038. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Quyen Leung can be reached on (571) 272-8188. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Dang D Le/

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/Naishadh N Desai/  
Examiner, Art Unit 2834

Primary Examiner, Art Unit 2834